



CALIFORNIA GARDEN

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The California Garden

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No. 12

A GOOD OLD BOOK

Found by The Early Bird.

Recently J. Wilkinson Elliot said to me, "You are always trying to write something like a trip in your garden, why dont you read a real book, here is one," and he handed me "A Tour Round My Garden," by Alphonse Karr, a Frenchman. No the book was not in French, else I could not have understood any but the polite parts such as, "Have you seen my father's old shoes," etc., but it was a translation inside an old time cover red cloth printed big in black and silver and reminded me of a prize I won at school, only that had a cover in blue and the insides were as ineane as those of this are delightful. It is an English publication, as it had to be so unblushingly to enthuse about flowers and insects and birds, so to dare to compare an eye-open trip round a garden with a personally conducted rush round the world in a steamship.

Not the least fascinating feature of this book are the quotations from and comments upon flower lore as written by the ancients and the poets and as the book seems so old and it does not say anywhere that it is copy-written I shall copy a short chapter called the virtue of plants.

There exists a work in sufficiently bad Latin, written in old times by a doctor named Johannes de Mediolano, of the Academy of Salerno, and attributed to the entire school of Salerno. This book,, which contains all sorts of medical precepts and rules for preserving health, and of which some are exceedingly whimsical, frequently recurs to my memory, in the course of the journey I am making round my garden, on account of the singular virtues attributed to certain plants by the said school of Salerno.

RUE, for example, of which I have already spoken to you, is a plant which merits all sorts of consideration, according to the learned doctor. In fact, by an uncommon prodigy, it diminishes the force of love in man, and, on the contrary, increases the flame in women. This plant clears the sight, and the perceptions of the mind, when eaten raw;

but when cooked, it destroys fleas.

This I warn,—and you can make use of rue according to your need: If you fall in love imprudently, and, by a strong effort of your own good sense, or by the advice of sincere friends, you perceive your folly, eat your rue raw; if you are tormented by fleas boil it.

Does not this aphorism, put forth in the most serious manner possible, quoted and respected by all old physicians,—(I am not acquainted with the sentiments of the medical world of the present day with regard to the school of Salerno,)—does not this aphorism appear to have been merely translated in a discourse which a writer of the present day puts into the mouth of a charlatan?—Buy my specific; Taken as a liquid it awakens, taken as a powder it promotes sleep.

But rue is nothing in comparison with sage. Sage preserves the human race, and the whole school of Salerno, after a long enumeration of the virtues of sage, seriously exclaims: "How can it happen that a man has sage in his garden, and yet ends by dying?"

The learned body replies to itself by saying: "It is a proof of the necessity of death, which nothing can enable us to avoid."

I have in my garden sages of various sorts: one is remarkable for its curious foliage; sometimes one of its notched leaves is painted half rose color and green, or rose color and white, or green and white. Some leaves are entirely rose color, or green, or white.

Another sage exhibits, at the extremity of its branches, flowers, and as yet unopened cups of flowers, of the brightest red (Salvia Fulgens); others are of a softer red, its blossoms clothed with a purple down (Salvia cardinalis); this one Salvia patens spreads forth its flowers of so clear and pure a blue, that every silk stuff, having any pretensions to be blue, takes by the side of it a different color, and inclines to green, yellow, etc.

I do not know whether, in the eyes of the partisans of the school of Salerno, it is not exhibiting an immoderate love of life, with

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a great desire to become a centenarian, to have so many sage plants around me; and yet I can safely affirm that I have only been led to cultivate them by the splendor of their hues.

Sage and rue, uniting their powers, allow you to drink as much as your inclination prompts you to take, without injury to your brain.

Permit me, my friend, whilst we are on the subject to quote a few more of the precepts of the school of Salerno.

I do not know what walnuts can have done to the learned doctors, but it is impossible to speak more disadvantageously of a poor fruit than they do. The first walnut is good, they say, the second is injurious, the third kills.

Do you remember the time when we did not take the trouble to count them, when we laid siege with stones to the great walnut tree which partly shaded the courtyard of the old house where we were educated? How the projectiles hissed as they cut the leaves, and brought down the fruit in showers. How we picked them up, and how we ate the conquered.

Perhaps the danger of eating walnuts is in an inverse sense, as it is in certain games,—when arrived at a certain number you lose. The third nut, doubtless, only kills when you don't eat a fourth or perhaps this dangerous virtue ceases to exist when the walnuts are stolen.

One of the recommendations upon which the learned doctor of whom we are speaking laid great stress, is,—“Never eat goose on the first of May.”

But here is an aphorism full of sense and wit: “Wash your hands often,” says the learned doctor Johannes,—“wash your hands often, if you wish to live in good health. Wash your hands after meals; it clears the sight.” And then adds, very seriously: “To wash the hands not only promotes health and clears the sight, but it also, incontestably, cleans them.”

MIGNONETTE

One of the most popular of all our flowering plants, Mignonette is, in some cases, also one of the most capricious. There are certain soils in which it absolutely refuse to thrive—germination may be good, early growth may be quite satisfactory, and plenty of bloom may show, but when the plants reach a certain stage they appear to turn “sick”, the foliage assumes a dingy red shade, and the flowers are unsatisfactory. In such cases some good may result from dressing the soil with lime before using it for Mignonette again, but, as has been said, there are some districts in which it is unsafe to rely upon Mignonette. There are, at times, complaints concerning failures from districts in which, indisputably, Mignonette, as a rule, does extraordinarily well. Such complaints annually come under my notice, and, in general, it is not a difficult matter to diagnose the trouble. The most common complaint is that the seeds have failed to germinate. In almost every instance it is found that the newly-sown seeds have been eaten by birds. Sparrows, chaffinches, and other seed-eaters have sharp eyes, and they can soon pick up a sowing of Mignonette to the last seed. The remedy here is, of course, to red lead the seeds before sowing. In other cases inspection reveals that germination has been good, but that slugs have cleared off the cotyledons as they peered through the ground. The cure, when slugs are seen, is to dust the sites on which Mignonette seeds are sown with fresh soot at frequent intervals until the seedlings become sufficiently strong to resist the attacks of their enemies. A third cause of failure, when neither birds nor slugs can be blamed, is sometimes traced to the fact that the seeds have been sown in loose, or newly-dug, soil. Mignonette delights in a firm run for its roots, and those who have soil of a light description, or who must sow seeds in freshly-dug soil, ought to beat it with the back of the spade, or tread it firmly, before sowing. After the seeds are sown rake the site lightly, and again beat or tread the bed. Such treatment will, very often, turn failure into success.—W. McG. in *Gardeners Chronicle*.

HORDS OF ARGENTINE ANTS THREATEN BALBOA PARK SHRUBBERY AND EVEN SAN DIEGO ZOO, OFFICIAL WARNING

By Robert R. McLean, County Horticultural Commissioner.

The Argentine ant is, without question, the most serious pest of plants and animals infesting Balboa Park, and immediate steps should be taken to control or completely eradicate it. Unless stringent measures are undertaken in this connection this ant will ultimately, directly and indirectly, work irreparable injury to plants and shrubs, to wild animal life, and possibly worst of all to the zoo. In addition to this, it will become an intolerable nuisance to tens of thousands of visitors who annually come to the park. This statement is not based upon conjecture, but upon the known reputation of this ant for having done in other places exactly what is here charged against it.

Already many plants in the park are being overrun with destructive insects by reason of the encouragement and protection afforded them by Argentine ants. Nesting birds are being driven away and their young ones killed by the unremitting attacks of ants. The feeding pens at the zoo are alive with these persistent pests and captive animals and birds are annoyed beyond measure.

The food given the animals, particularly meat, is the magnet that draws ants by the millions. It is an open question how long the zoo can maintain its present position if the ever-increasing hordes of Argentine ants are not soon checked.

Control or even eradication of Argentine ants is not particularly difficult, but whatever measures are put into operation must be persistently and intelligently followed up. A syrup containing a weak poison is the most effective remedy yet developed. This poison is taken by the workers to the nests and fed to the queens and young, eventually destroying the colonies. If a strong poison is used only a few workers will be killed, as the rest will refuse to take any more of it.

Eradication of ants over a few hundred acres in the park is a comparatively simple matter compared to what the state of Mississippi is hoping to do. The plant board of that state believes the Argentine ant can be eradicated from the entire state and in support of its belief, points to the actual eradication of yellow fever, Texas fever, the citrus canker and the pink boll-worm of cotton from the state of Mississippi in recent years.

Eradication Possible

"Mississippi is now threatened," states this board, "with a pest that will cause enormous loss and great annoyance in the future. We

know that it is possible and practical to eradicate the Argentine ant. If it is not eradicated, we know that in time, every property and everyhouse, barn, store and other buildings in Mississippi will be infested. We know that if the Argentine ant is allowed to go unchecked, it will cause directly and indirectly a loss that will amount to millions of dollars annually. If the Argentine ant is not eradicated it will be here always. Our children's children a thousand years from now will have to fight this pest every day and every year simply because we were not farsighted enough to eradicate it when we had the opportunity." An annual appropriation of \$100,000 is urged by the plant board as the beginning of an eradication campaign to extend over a period of several years.

San Diego can eradicate Argentine ants now, by a relatively small outlay of money, but each year the work is delayed the cost will be higher, as the infested territory is constantly increasing. By all means, however, a start should be made in Balboa Park and in the zoo.—San Diego Union.

WASH AWAY IVY POISON

Thorough washing soon after exposure to poison ivy reduces the danger of injury, says the United States Department of Agriculture. The poison usually requires some time to penetrate into the tender layers of the skin, and until such penetration has taken place much or all of it can be removed.

Make a thick lather and wash several times, with thorough rinsing and frequent changes of hot water, using ordinary alkaline kitchen soap. Running water is preferable for this purpose. If a basin is used, the water should be changed frequently. Even after inflammation has developed, thorough washing should be tried in order to remove from exposed surfaces of the skin all traces of the poison that can still be reached.

For the inflammation, simple remedies, such as local applications of solutions of cooking soda or of Epsom salts, one or two heaping teaspoons to a cup of water are helpful. Fluid extract of grindelia diluted with 4 to 8 parts of water, is often used. Solutions of this kind may be applied with light bandages or clean cloths. Such cloths must be kept moist and discarded frequently in order to avoid infection. When the inflammation is extensive or severe it is best to consult a physician.

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ABOUT CHRYSANTHEMUMS

QUESTION

California Garden:

Any information you could give me as to how best treat Mums for large flowering would be greatly appreciated. How late should they be cut back? How low? etc., etc. Do you cut back Pompoms as late as large ones?

F. RHODES,

4953 Saratoga Ave., Ocean Beach.

ANSWER

CHRYSANTHEMUM CULTURE

From S. R. Hotchkiss, Wissahickon Inn,
Redlands.

Written for the Horticultural Society by
"Dominie" Kirkpatrick

The Horticultural Society is fortunate in being able to give its members and the gardening public an article an chrysanthemum culture from the pen of "Dominie," D. M. Kirkpatrick, past-master in the art, and winner of numberless ribbons and cups at the fall flower shows of the society. The Dominie modestly states that his article will be a help only to the veriest beginners. This statement we doubt. Especially to be appreciated is the invitation to visit his garden for observation of his methods and advice which he gives so generously and freely, in spite of the fact that he may be raising up many competitors in future flower shows. But that is characteristic of any gardener worthy the name.

For the benefit of those especially who are truly beginners in the culture of this wonderful fall flower, the Dominie gladly accedes to the wish of the society and submits the following:

To be a successful grower there are a few things one must know and there are also a few things one must do. There are two important factors in the expression of all forms of life. These two are: (1) Heredity, and (2) environment; without these factors, all your work will end in failure. For example, at the fall flower show you will observe that the chrysanthemums are divided into three distinct classes: (1) the standards, these are the large and showy plants so many admire; (2) the pompoms and (3) the singles. These last two varieties are each in themselves beautiful, but no amount of culture could make a "pompom" or a "single" into one of the large standard kind, at least not in one or many seasons. So then, if you wish to have in the fall a large and attractive plant, you must begin right. Be sure you have the right start. There exists inside every plant an

inborn tendency known as heredity. Some plants grow tall. Some are dwarf, others medium height. Some plants bloom early; some plants bloom late. To "average up", the grower ought to make a chart of the name and habit of each plant, marked so as to encourage or retard this inborn tendency.

Assuming your chrysanthemums are all planted out, whether the pompon, single or standard variety, all kinds ought to be topped or cut back, now or at least within three or four weeks. The purpose of this topping or cutting back is to produce laterals or shoots from each leaf. There will appear a shoot when these laterals are say, three or four inches long. All but two are removed, and these two laterals or stalks are tied to stakes or crosswire (stakes are better), until about the end of August, when four buds will appear on the end or top of the stalk. Select the center or largest bud, remove the others. It will take about six weeks for this bud to fully mature. From each plant two, not more than three stalks from one root. As these stalks are growing, each week you ought to tie with raffia, not string, also while training these growing stalks you must remove the laterals that shoot out from each leaf on the stalk. You cannot have quantity and quality too. This, of course, applies only to the standard varieties.

There are several rules to guide you in what to do—when and how. Observation and experience are two of the best teachers. To observe, go to Sylvan Park, watch "Bob" Adams. He is ever cheerful and never too busy to advise. The Dominie welcomes anyone to his garden who is seeking information.

Water regularly every ten days, but not too often. Look out for two bad enemies, aphids and an insect called leaf-tier. This enemy appears about midsummer and continues until fall. Two things to do: (1) Spray with Blackleaf 40. Add to cup of spray one tablespoonful of kerosene. (2) Keep a diligent lookout for the shriveled-up leaf. Cut the leaf off and you will find a very active green worm, which if left on the plant will soon destroy it entirely.

When the buds appear, then it is a good time to feed the fast-maturing plants. Some use to advantage a little "blood" or "tankage"; personally, I prefer liquid manure, made from good barnyard manure. Give about a cupful to each plant after irrigation. If in doubt or trouble, visit the gardens where the flowers are successfully grown. Any flower lover is welcome in the Dominie's backyard. Remember there are many, many things to do. Here we have but hinted at a few of the primary things. That your efforts will be crowned with success is the sincere wish of "The Dominie."

The June and July Gardens

GARDEN REMINDERS

By Mary Matthews.

Carry on the work of last month, such as transplanting annuals for late summer bloom. Among perennials Verbenas and Petunias can be put in with a good chance for success at this time. The weather for this season has been "so unusual" that many things are very backward and small stuff put in now may give excellent results in the late summer. Among the tender subjects two good things are Primulas in various kinds and the new Calceolaria Clibrani—seeds of these can be sown now in flats filled with light sandy soil, merely press the seeds into the soil and shade until germination has taken place when they can be brought nearer the light. As soon as you can handle the seedlings pinch them off into boxes putting them about two inches apart, then when larger place them where you may desire. Both of these make good lath house specimens.

The last of the month make a sowing of Mignonette in the open; have your soil loose but not too rich.

Look around all plants that have been put out lately and firm the soil well around them, the sooner this is done the better but do it when the soil is rather dry.

The division and the arrangement of plants in your beds and borders ought to be finished by this time, there are always novelties among hardy plants each year that you will want in your garden, these can be grown separately. Seed put in now will give you good plants now for later setting. If you have room for only a few plants of a kind it may not be worth while to sow seeds and this applies especially to the perennial sorts more than you want. There is an immense amount of seedlings wasted—but where you want a quantity seed sowing is much the best. Some one has said that the common objection, "It is too much trouble" is not really an objection, but is really a confession of laziness. There is a sporting element in raising perennials from seed. You are liable to get something new from any batch of seed.

As the warmer weather comes on spring blooming bulbs will be rapidly maturing foliage and this is the time to lift them when putting them back into the ground, work the soil over thoroughly adding a good lot

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THE GARDEN

By Walter Birch

Now that real summer time is approaching it is increasingly important to keep active in the garden, both flower and vegetable. The condition of the soil is the first condition, because, after all, the whole success of your garden primarily depends on that. Therefore see that your fertilizing is sufficient, your moisture correct and your cultivation deep and fine.

The more I use surface mulching, around practically all kinds of plants (after getting the ground in first-class condition, so that it can be kept so by stirring the mulch sufficiently to keep down weeds), the more grateful I feel for the mulch, particularly during the summer months. It conserves moisture, gradually feeds the soil, prevents baking of heavy soils and drying out of light soils, and at the same time preserves the tilth of the soil intact, provided your soil is in first-class condition when you apply your mulch. The next consideration is moisture, and it is up to you to use your judgment according to the texture of your soil and the variety or varieties of plants you are growing, always remembering, however, that while there is a wide divergence in the need of moisture of different plants, practically all plants need some moisture, usually enough to promote a healthy growth, therefore avoid a feast or a famine, so to speak, but keep up a uniform moisture and cultivation of the surface of the ground, remembering that if you sprinkle where there is a mulch, you must allow enough extra water to penetrate the mulch, in addition to what you would use without it.

Look out for insect pests and always keep a small spray pump and supply of Nico Spray for plant lice and Arsenate of Lead for leaf-eating insects and a good bait for snails. For the latter it is hard to beat Calcium Arsenate and bran. In case of mildew, rust and blight, use Qua-Sul, but use it before the plant is attacked, or if attacked pull off the badly affected foliage and burn, and thoroughly spray remainder of plant.

Fertobac, a preparation of tobacco leaves and stems, makes a capital combined fertilizer and insecticide. By using a little of this as a mulch round your plants, you will get rid of many insect pests and at the same time fertilize the plants.

(Continued on Page 10)

The California Garden

Editor

Alfred D. Robinson

Associate Editor

Miss Mary Matthews

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EDITORIAL

This is being written while a special effort is in progress to get out this June number in time for the Annual Meeting of the Floral Association on the fifteenth of the month. Hoping that success may crown this effort, we find ourselves for the first time in a position to freely comment upon the Association, its activities, and officers, because we have had so little to do with the first and have not figured among the latter, during the past year.

The term now ending has been one full of emergencies, a continual change of officers due to death and other causes, and in a minor degree the loss of the Civic Auditorium for show purposes, nevertheless it has been a very successful year.

There are few organizations which owe so much to their officers as the San Diego Floral Association. They are called upon to guide the affairs of a large and active body without remuneration other than that accruing to the knowledge of good deeds well done, and with very limited funds. The dues fixed at \$1 per year when a dollar meant something as a purchasing unit, are now almost ridiculous, especially when the benefits they secure are considered, and no doubt a substantial increase would be readily voted by the members if some one would take the trouble to

go through the formula necessary to get action, but just now the vital matter is the election of Directors for the coming year.

Last year President L. A. Blochman was obliged to resign because he changed his residence to San Francisco, then the long time Treasurer, W. P. Brothers, passed over the Divide, to be followed quickly by his successor, John Burnham and in the place of these three the four remaining Directors appointed, Mrs. John Burnham, R. R. McLean, the County Horticultural Commissioner, and B. L. Elliot, late of the Elliot Nursery Co. of Pittsburgh, a choice that seems wise and fitting. These names are specially recited here to call attention to the fact, that in consenting to their appointment for the short term of a month, these three have exhibited a spirit of service free of the personal view point, that is most unusual and it is to be hoped that the electors will appreciate the fact.

We have taken the liberty almost of giving this slant to the matter because elections in such bodies as the Floral Association are so often merely mechanical, but we do not presume to try to influence voting beyond attempting to make votes considered ones. Every member should be well aware of the splendid service of the outgoing officers, though it is not unknown for such to end their term of office without even a vote of thanks, and the others on the ticket have expressed by deeds their interest in the organization, and not the least convincing of such actions is that of allowing their names to go on the ticket without any assurance of being elected. Practically this is what happens, the proposer of a candidate for Director approaches the victim and says, Will you let your name go on the ticket for Director in the Floral Association. I don't know any more than you do whether you have a chance for election but should like you to try it? This is not the way with most organizations and their nominating committees, but it certainly is democratic. Speaking as a many times Director we confess we never got all our choice in at one time, but we like the system, and should deplore anything like a slate.

The future of the Floral Association fairly bristles with opportunity. The City of San Diego is growing fast, whether all the realtors cries about recognizing and using the natural beauties of its unique situation and topography and climate, are all wool, does not affect the truth of the matter that the trend of growth is along that line. There is a tremendous increase in the emphasis laid on the grounds surrounding homes. Just at present plantings are mostly stereotyped and lacking in evidence of individual taste or care, but that is the main reason for the offices of such a body as the Floral Association which, with its lectures, its shows and

Patronize the Garden Advertisers.

magazine, strives to make folks care and then know something about gardens in this land of peculiar conditions.

The suggestions for development in Balboa Park by Walter Merrill, printed in the May California Garden, are suggestions for activity on the part of the Floral Association. There has always been a blessed understanding between the Park Board and the Floral Association and no member has done more for the latter than Superintendent Morley, and this attitude must have become a fixed habit by this time.

Then there is this magazine which has for long been waiting for a competent editor and if you read over carefully the names on the ticket for Directors you will find his there.

NOTICE OF ANNUAL MEETING

HEAR YE! HEAR YE!

All members of the San Diego Floral Association are hereby advised not to miss the extra-special annual meeting to be held at the Floral Home in Balboa Park on Tuesday evening, June 15th, at 7:30 o'clock.

There will be a musical program furnished by Miss Kathryn Thompson, a stereopticon lecture on Paris by Mrs. Herbert S. Evans, remarks by Mr. Ernest E. White, as well as the customary election of directors. The reports of the officers will be short and snappy, and will be followed by some especially tempting refreshments from the capable hands of the House Committee.

So write the date down in your engagement book—June 15th—and don't forget to remember it!

A HOME MADE POWDER BOX

Did you ever try to dust the garden plants with lime, insect powder, or similar material? If so, unless you had a regular sprayer, you know how disagreeable it can be. If the wind blows, you are almost sure to get some of the material in your face; you often get it on your hands; and if the plants are small, it is a back-breaking job. If the material happens to be scented with turpentine or carbolic acid, it is worse than ever.

Here is an idea that will take away all these unpleasant features, will enable you to do the work much more quickly, will cost you nothing, and will take less than five minutes to make.

Simply take a pepper box and nail it to the end of a lath. Fill the box with the material, walk down the rows, and sift some on each plant. Even if you have a large sprayer, when the plants are small the pepper box sprayer, on account of its small size, will save waste of material and is much lighter to carry.—H. L. S., Michigan.

CALCIUM CYANIDE VALUABLE IN FUMIGATING GREENHOUSE PLANTS

Calcium cyanide during the last few years has attracted considerable attention from entomologists because of its promising insecticidal properties, says the United States Department of Agriculture. Of late this chemical compound has been used rather extensively in greenhouse insect warfare as a source of hydrocyanic-acid gas for fumigating purposes. It is a more convenient source of this gas than either potassium or sodium cyanide, as it does not require jars or the addition of sulphuric acid and water to generate the gas.

On exposure to the air calcium cyanide slowly reacts with the moisture of the atmosphere and gives off hydrocyanic-acid gas.

Calcium cyanide, because of its gradual liberation of the gas, requires exposure lasting from three hours to overnight. Owing to its extremely poisonous character, hydrocyanic-acid gas must be handled with great care in order to prevent disastrous results.

Fumigation of the greenhouse is best done after dark, the work being started preferably at least one hour after sunset. It is advisable to fumigate in mild weather, but hot, humid nights should also be avoided. Temperatures ranging between 60 degrees and 70 degrees F. are most desirable. The frequency of fumigation depends on the kinds of insects to be controlled and the proportion killed with one exposure. Several fumigations at intervals of a week or ten days may be necessary in controlling the more resistant insects.

A new Department Circular, No. 380-C, "Calcium Cyanide As a Fumigant for Ornamental Greenhouse Plants," gives details concerning the use of this chemical as a fumigant. A copy of the publication may be obtained free, as long as the supply lasts, by writing to the United States Department of Agriculture, Washington, D. C.

FOR THE HANGING BASKET

The Ivy-leaved Pelargonium has long been a favorite for hanging baskets, and there is no time better than the spring to make a start in planting. Baskets should be well lined with Moss and soil made up of loam and leaf-mould, with a little sand pressed well down, watered, and allowed to settle before introducing the occupants. Young stock cuttings of the Pelargoniums are to be preferred to older plants, as they are more amenable to training. Two, or possibly three, according to size of basket, will usually suffice, and the centre shoots should be pinched out to induce lateral growths which should be tied to the sides of the baskets, so that eventually nothing will be seen but a mass of foliage and flowers.

THE FOXGLOVE

To give distinction to the ordinary hardy perennial and shrubby border few plants equal and none surpass the common foxglove (*Digitalis purpurea*), especially when its improved horticultural varieties are used. Its erect racemes, usually two to four feet tall, rise above the ruck of ordinary sprawly plants like dignified spires adorned with bells. During the two or three weeks they are in their prime they easily dominate the border and give a suggestion of permanence to the whole planting. In both the old-fashioned garden and in the newer styles these clean and commanding plants with their strong vertical lines add a dignity not easily secured by any others.

While the bell-like or finger-like spotted flowers of the original species are about two inches long and usually purple there are improved forms with larger and finer flowers of various colors and markings; for instance, the spotted foxglove (*Digitalis purpurea maculata*); the leopard foxglove (*Digitalis purpurea maculata superba*); the gloxinia foxglove (*Digitalis purpurea gloxiniaeflora*—sometimes *gloxinioides*) the double foxglove (*Digitalis purpurea monstrosa*) and the white foxglove (*Digitalis purpurea albo*).

The individual foxglove plants may occasionally prove to be perennial the great majority are biennial. The seed is very minute and should therefore be sown in pans, flats or frames. Seed sown out of doors in midsummer should produce plants that bloom the following season, as should also those grown under glass if started in midwinter. After the flowers have fallen if the ground is not disturbed in the neighborhood of the plants already growing in the border, seedlings in abundance will be produced for the following seasons blossoms; but no one need fear that foxglove will become a pest. The young plants are very easily destroyed by the hoe.—M. G. Kains in Popular Gardening.

PHYLLOCACTUSES

There are certain plants which loom very largely in the world of horticulture just, and only just, during their season of blooming. At other times they call forth little or no admiration. Such are Phyllocactuses, that sometimes appear utterly indifferent to the treatment meted out to them, whether they are kept in the same pot for long or not, whether they are given room under glass or in some cottage window. Indeed, specimens which I have seen from time to time in village homes in pots have demonstrated that these quaint plants call for no special culture. Their propagation, too, is equally simple; pieces of

the flat stems will strike in pots of gritty soil, or, following the plan of country folk, stems stuck in the sides of the pot of the parent plant eventually take hold. It would, I imagine, be difficult to cite plants possessing greater contrasts. See them without flowers and they present a mass of ill-shaped, flat stems, raising little or no enthusiasm, but watch them, as on the points and outer edges of these same stems swellings appear, which gradually assume the shape of buds, until some sunny day a transformation takes place, and plants that hitherto have scarcely called forth comment all at once burst forth into beauty in blooms of rose and red, and crimson, orange, and white. Loam and leaf-mould, with a little mortar-rubble, makes a suitable compost for Phyllocactuses, and they do best when in a potbound state. Approaching their flowering period they should be watered liberally; at other times they need but little.—W. F. in Gardeners Chronicle.

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3. Best Collection of Vines.
4. Best Collection of Potted or Boxed Ferns.
5. Best Specimen Sword Fern.
6. Best Specimen Fern Other Than Sword Fern.
7. Best Decorative Plant for House.
8. Best New Plant or Flower Not Exhibited Before.
9. Best Collection Potted Plants.
- *10. Best Display of Begonias, grown in pots or boxes.
11. Best Vase, Basket or Other Arrangement of Zinnias.
12. Best Collection of Zinnias.
- *13. Best Collection of Asters.
- *14. Best Arranged Basket of Flowers by Professionals.
15. Best Civic or Service Display of Plants and Flowers, Quality and Arrangement to be Main Points.

Section B—For Amateurs

16. Best Collection Asters American Beauty Type.
17. Best Collection Asters, Crego Type.
18. Best Collection Asters, Victoria Type.
19. Best Collection of Asters, Single Type.
20. Best Vase of Asters, Any Variety, 25 Blooms.
- *21. Aster Sweepstake.
- *22. Best Collection of Annuals.
- *23. Best Arranged Basket of Flowers.
- *24. Best Collection of Bulbous Flowers.
25. Best Collection Gladiolus.
26. Best Display of African Marigolds.
27. Best Display of French Marigolds.
28. Best Collection of Perennials.
- *29. Best Collection of Zinnias.
30. Best Six Blooms Zinnias, Red or Red Shades.
31. Best Six Blooms Zinnias, White or White Shades.
32. Best Six Blooms Zinnias, Pink or Pink Shades.
33. Best Six Blooms Zinnias, Orange or Orange Shades.
34. Best Six Blooms Zinnias, Yellow or Yellow Shades.
35. Best Six Blooms Zinnias, Lavender or Lavender Shades.
36. Best Six Blooms Zinnias, Any Other

Color.

37. Best Six Blooms Zinnias, Picotee Type.
38. Best Twenty-five Blooms Mixed Zinnias, Small Mexican.
39. Best Collection Lilliput Zinnias.
40. Zinnia Sweepstakes.
41. Best Arranged Vase or Bowl of Zinnias, Greenery Allowed.
42. Best Arranged Basket of Zinnias, Greenery Allowed.

Section C

43. Best Collection of Potted Fibrous Begonias.
44. Best Display of Cut Blooms, Fibrous Begonias.
45. Best One Specimen Fibrous Begonia.
46. Best Display Potted Fibrous Begonias.
47. Best One Specimen Tuberous Begonia.
- *48. Best Collection Rex Begonias grown in pots or other receptacle.
49. Best One Specimen Rex Begonia grown in pot or other receptacle.
50. Best Specimen Rex Begonia, San Diego Seedling, open competition.
51. Best Arranged Basket, Vase or Bowl of Ferns and Begonias.
52. Best Specimen Maidenhair Fern.
53. Best Specimen Fern Other Than Maidenhair.
54. Best Collection of Ferns.
55. Best Fern Hanging Basket.
56. Best Hanging Basket Other than Fern.
57. Best Foliage Plant for Interior Decoration.
58. Best Flowering Vine (must be in flower).
59. Best Collection Cut Sprays, Flowering Trees or Shrubs.
60. Best Collection Berried Shrubs (cut sprays or in pots).
61. Best Collection Bamboo and Grasses.
62. Best New Flower or Plant Not Before Exhibited.

- *63. Best Dining Table Decoration.

Section D—Dahlias—Professionals

- *63. Best General Display Arranged for Effect, potted plants and foliage allowed for embellishment.
64. Best 12 Blooms, any variety.
65. Best 12 Blooms Cactus, 1 or more varieties.
66. Best 12 Blooms Hybrid Cactus, 1 or more varieties.
67. Best 12 Blooms Collarettes, 1 or more varieties.
68. Best 12 Blooms Decorative, 1 or more varieties.
69. Best 12 Blooms Fancy or Viriegated, 1

Class

- or more varieties.
70. Best 12 Blooms Peony, 1 or more varieties.
 71. Best 12 Blooms Pom Pom, 1 or more varieties.
 - *72. Best 12 Blooms Show, 1 or more varieties.
 73. Best 12 Blooms Semi-double or Duplex, 1 or more varieties.
 74. Best Collection Cactus Dahlias, 1 bloom each variety.
 75. Best Collection Hybrid Cactus, 1 bloom each variety.
 76. Best Collection Collarettes, 1 bloom each variety.
 77. Best Collection Decorative, 1 bloom each variety.
 78. Best Collection Fancy or Variegated, 1 bloom each variety.
 79. Best Collection Peony Flowered, 1 bloom each variety.
 80. Best Collection Pom Poms, 3 blooms each variety.
 81. Best Collection Show, 1 bloom each.
 82. Best Collection Semi-double or Duplex, 3 blooms each.
 83. Best Collection Single Dahlias, 3 blooms each variety.
 84. Best Collection of California Dahlias, 12 blooms, 12 varieties.
 85. Best Established Three-year-old Seedling.
 86. Best Collection Unregistered Seedlings.
 87. Best 1925 Seedling.
 88. Best 1926 Seedling.
 - *89. One Best Bloom Exhibited at Show, stem and foliage considered.
 90. Smallest Perfect Pom Pom Dahlia.
 - *91. Most Artistic Basket of Dahlias in Show, use of other foliage permitted.
 92. Most Artistic Basket of Pom Poms in Show, use of other foliage permitted.
 - *93. Dahlia Cup for Best (6) Blooms, (1) bloom each of 6 classes, one bloom only in each vase. Open to all.
 - *94. Best 6 Blooms, 6 Varieties, California Introductions. (Gold Medal Dahlia Society of California.) Open to all.
- Amateurs**
- *95. Best Collection of Dahlias, 1 of each variety. Prize Competitive Cup to be won for three years.
 96. Best Six Blooms Cactus, 1 or more varieties.
 97. Best Six Blooms Hybrid Cactus, 1 or more varieties.
 98. Best Six Blooms Collarettes, 1 or more varieties.
 99. Best Six Blooms Decorative, 1 or more varieties.
 100. Best Six Blooms Fancy or Variegated, 1 or more varieties.
 101. Best Six Blooms Peony, 1 or more varieties.
 102. Best Six Blooms Pom Pom, 1 or more varieties.
 103. Best Six Blooms Show, 1 or more varieties.
 104. Best Six Blooms Semi-double or Duplex, 1 or more varieties.
 105. Best Six Blooms Single, 1 or more varieties.
 106. Best Collection Cactus Dahlias, 1 bloom each variety.
 107. Best Collection Hybrid Cactus, 1 bloom each variety.
 108. Best Collection Collarettes, 3 blooms each variety.
 109. Best Collection Decorative, 1 bloom each variety.
 111. Best Collection Peony, 1 bloom each variety.
 112. Best Collection Pom Poms, 3 blooms each variety.
 113. Best Collection Show, 1 bloom each variety.
 114. Best Collection Semi-double or Duplex, 3 blooms each variety.
 115. Best Collection Single, 3 blooms each variety.
 - *116. Best Dahlia Exhibited by Amateur.
 - *117. Best Artistic Basket of Dahlias, use of other foliage permitted.
 - *118. Best Artistic Basket of Pom Poms, use of other foliage permitted.
 - *119. Best Keeping Dahlia in Amateur Section.
- *Indicates cup or other trophy in class so indicated.
- Dahlias will be judged according to following points.
- Color 20, Stem and Foliage 25, Substance 15, Form 20, Size 20, equals 100.

THE GARDEN

(Continued from Page 5)

A planting of sweet corn and beans at this time is advisable for late summer use, and tomato plants and peppers can be set out.

Many people complain at this time of year of the blossoms falling off their tomato plants and no fruit setting. This is largely the result of over-watering. Water by basin about every two weeks and cultivate thoroughly, but not too close to the plant. A mulch of strawy manure will prevent too much drying out.

Do not neglect the lawn at this time of year, constant watering and cutting once or twice a week will help a lot. Use a good, complete fertilizer, a small quantity of sulphate of ammonia in water applied with a sprinkling can and followed with a wetting down with the hose, or a sack or two of Groz-It, a fine pulverized sheep manure, which is weedless, owing to the fact that the sheep are fed on the by-product of cotton, which makes the manure much richer in plant foods than it would be if the sheep were fed in the ordinary way.

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LATH HOUSE MATTERS

By Alfred D. Robinson.

Those old enough will remember the Ping-pong craze, a kind of dining room tennis, and the popular song it made, Ping-pong for breakfast, Ping-pong for lunch, Ping-pong for dinner and tea, etc., ending with, Ping-pong I'm dreaming of thee. Well that is my case now, only it's potting instead of ping-pong. Stuff is growing out of pots overnight and the seedlings are rapidly making sure-enough plants. Again I would warn against too big a pot shift, a good rule is an inch bigger all round which would be a two inch larger pot. It is good practice to soak all pots leaving them in the water till the surface shows wet. In many cases watering from the top fails to wet the soil evenly, the water will seep through along restricted channels. With Begonias and allied plants do not pot but a little deeper than formerly, so many varieties have a definite crown that will not stand for being buried. Don't be afraid to top back weedy specimens, there is not half enough of this done with Begonias. Cuttings of any kind will root now.

My tuberous have never been so happy looking at this season, partly due no doubt to the unusually warm May. They have retained their blooms from the first and the foliage is large and excellent in color. Another factor has been the better potting mixture. This year it has been half leaf mould from the mountains, not the stuff scraped up under the brush near the coast, half a binned mixture of just dirt, sand and cow manure with an addition of half a shovelful of fine charcoal and the same amount of bonemeal to the barrow load. I lay peculiar stress on the charcoal, I believe lots of trouble last year was due to its absence. I use straight sand with the leaf mould for seedlings in flats adding the charcoal only.

I am trying out peat shipped from Holland to San Francisco in bales and then retailed to me in San Diego at a cost bulk for bulk of very little more than I am now asked for leaf mould from our mountains forty miles only away. I expect this to be most valuable for hanging baskets as it is a straight fibrous humus that will not wash out of the baskets like a sandy mixture. It will probably also suit the Rexes. More about it later, I am trying it on the dog, myself.

Last year I started using large, shallow, hexagonal trays on standards for display purposes, the immediate urge being a desire to get massed effects, and ever since I have been wondering why I was so dumb not to have made them years ago. There are any quantity of lath house things that need to be

grouped for real appreciation. Today I made up one with that wonderful double Lobelia Kathleen Mallard, a plant that has charmed me always with its rose-liked double blooms of deep blue, but now I know one has not seen it till regarded in mass. This Lobelia makes no seed but is easily propagated from cuttings. Later I hope to get a yellow combination with it when the tuberous get further along. And that reminds me that I hope I have a start towards the fibrous yellow Begonia. Rumors of one have reached me for years which finally crystallized on a variety called Frau Helene Harms, which, when run down turned out, in the catalogue description, to be a tuberous, said to thrive in strong sunlight in pots, greenhouse conservatory or out of doors in the open border. Is it surprising that I said I must have one or two or so, and I sent good San Diego money all the way back to Boston, last February, and today, June 4, six little plants ended a thirsty struggle across the continent. Frankly I am withholding any opinion with difficulty. I want to be fair and I try and remember that in all that list of catalogued virtues nothing was said about journeying ability. The Frau needs a permanent wave or something and looks darned like a tuberous that had not grown up, but time will prove and if my suspicions that I have been stung again, the price was Floridian almost, prove unfounded, I will fess up.

Let the lath house folks be of good courage, I have found, or rather was found by, a realtor who freely admits that in building his houses for sale he overlooked a good bet when he ignored the lath house, he is even now trying to sell one of you a house so that he can tack a lath house on to another. I think he is quite sincere, he has been back to my lath house more than once with different folks to watch the effect of it upon them, and plainly the reaction was satisfactory. He does not owe me anything anyway, he put himself in a position that allowed me to get him down in a deep low chair and hold him there while I spilled all my lath house obsession all over him and he has not yet placed me with the idiots or the prophets but he knows I belong with one or the other.

Then Walter Merrill has revived the Park lath house idea. I was glad he stated that he did not claim it as original for I dreamed it, was it a thousand year ago, in this magazine, and for ages it has been one of Superintendent Morley's strong hopes. I should not be surprised if this latter has a location spotted and monuments erected. Are not

monuments the piles that the optimistic prospector litters around in the brush of the hills? Personally I don't think the Park lath house need be so very expensive to build nor its upkeep so large afterwards. It would require specialized care but the right man, or woman, for much lath house work comes easier to a woman than a man, can look after a great deal of this sort of thing. Naturally the planting would be intensive and as compared with outside the water used is negligible. I have been surprised to find how small the consumption of rain water has been with my seedlings and small Rexes. As an early advocate if not the originator of the idea of a Park lath house I feel compelled to stress the point that if such be contemplated it must be planned large enough to let the public not only go in and circulate but be able to sit down and enjoy. My original proposition was to have a band concert therein, but I could do without quite that much sitting area.

NAPHTHALENE AS PEST EXTERMINATOR

By N. H. Wardale, in *Better Flowers*.

Lovers of flowers are congratulating themselves on the early spring and the rapid growth of their favorites. There is, as always, however, "a fly in the ointment." The lack of cold freezing weather will cause the pests which prey on gardens whose name is already legion to multiply more than ever. Most of the present methods of combatting these pests are applied after they are hatched out and have begun their ravages on the leaves buds and shoots of plants. This is probably for the lack of any better method of treating than spraying and dusting the plants.

Many of our worst pests either live in the soil or their eggs are laid hatched and the larvae grow in it. To get rid of the pests at their source or in the soil would certainly be more efficient than the present method.

There is now being placed on the market a by-product of gas manufacture made at the plant of the Portland Gas & Coke Company called "Naphthalene." This substance has been known and used with great success by European growers for many years for preventing such soil pests as cutworms, wire worms, slugs, centipedes, aphids, ants, beetles and other insects as well as the fungus diseases which attack bulbs and roots of plants.

Treatment is simple and inexpensive, consisting of raking or harrowing naphthalene, which is a substance similar to coarse granulated sugar with the odor of moth balls, well and deeply into the soil before sowing seeds or setting out plants. It is also used by raking around plants, shrubs and trees, the principal requirement being that it be well distributed into the soil and not left on its surface to evaporate slowly and lose its strength.

It is sold both in natural state and also blended with a well known fertilizer. In the latter form it is recommended for use in the

home garden. For those who have their own ideas on the fertilizer to use, the straight naphthalene is recommended. Before distributing the unblended product it is best to mix it with dry earth, ashes or commercial fertilizer as in this way it is easier to distribute evenly in the soil.

Bulb growers have especially found it beneficial and one of the leading growers of British Columbia in an interesting paper, "Raising Bulbs in the Northwest," states that he has raised healthy bulbs of larger size on land which previously only produced diseased and inferior stock, after the land had been treated with naphthalene.

Investigation of the use of naphthalene by growers in Western Canada by Frank C. Riggs, past president of the Portland Rose Society, has shown it to be very successful and apparently to have no ill effect on the soil.

Naphthalene is being used also for control of white and green fly in greenhouses. The method used is to sprinkle naphthalene on the soil and floors and close the house tight overnight, repeating the treatments at intervals of about one week to destroy insects which may hatch out between treatments. It is advisable to use care in the application, especially when delicate flowers and shoots are in evidence as an excess of naphthalene might cause some harm.

The proportions to use on the soil are about 1 pounds to 100 square yards of naphthalene mixed 50-50 with other material, this is approximately a handful to the square yard. If the naphthalene in its natural state is used one-half the above quantities are sufficient or 200 pounds to the acre.

A Tualatin valley strawberry grower, who is treating his plants with naphthalene, used it on a fourth acre of his land before sowing peas. Although other parts of his farm are overrun with moles there are no signs of them among the peas which are well above the ground. In previous years the moles have eaten out whole rows of the sprouting peas. This experience is borne out by that of other growers who state that moles avoid soil treated with naphthalene.

Many methods of using naphthalene are described in Bourcart's standard work on "Insecticides, Fungicides and Weed Killers."

TROPICAL "CORN" IS A FRUIT SALAD

The "Monistera Deliciosa," Which Is Grown in Trinidad. Its Blossom Looks Like a Calla Lily and Its Fruit Has the Appearance of an Ear of Corn and Tastes Like a Combination of Bananas, Pineapples and Strawberries.

From tropical Trinidad comes a new and strange fruit or vegetable—scientists are puzzled in deciding to which family it belongs—that is a veritable salad in itself. It is called the "Monistera Deliciosa." This vegetable-

fruit looks like a glorified ear of corn and tastes like a combination of ripe strawberries, pineapples and bananas. The blossom presents the appearance of a large calla lily. Eighteen months is required for the fruit to develop.

Experts of the United States Department of Agriculture are now conducting experiments with this strange plant at the Bureau of Plant Introduction located at Miami, Fla., with the object of growing it in the subtropical districts of the United States.

Although shops with refrigeration make it possible to bring this fruit-vegetable from its tropical home to markets in the north, Uncle Sam's experts hope to be able to develop it in such a way that it can be easily grown in the American tropics.

The above was clipped from some newspaper, probably the San Diego Union, because the clipper takes no other, it was accompanied by an illustration with a background of a Monstera with its characteristic perforated leaf setting up like a spread peacock's tail with the fruit unquestionably like a calla but more like a Jack-in-the-Pulpit, representing the bird's body. This is an old friend, you will meet it in lath houses and in Banks and Offices trying to climb and sending out its aerial roots, it always makes me think of a song of my youth which advocated climbing, and went among otherwhere thus, "Oh try to climb to fame, Yes, try to climb to fame but if you can't climb to fame, climb a post." The California Garden, some numbers ago, commented on a picture and account of this plant in an Eastern Floral Magazine, where it featured with Burbank as the Telegraph plant. It fruits right here in San Diego, the fruit is like an ear of corn, but nothing glorified about it, nor to the ordinary palate does it savor of strawberries, pine apples, or bananas, either severally or in combination, and I have failed so far to find anybody to eat mine beyond a first taste and even that all but the very polite promptly spit out. It is comonly called the Philodendron.—(Editor).

AN IRIS BULLETIN

A new bulletin issued in January by the United States Department of Agriculture on the subject of "Garden Irises" is now available for free distribution. It can be procured either direct from the Department at Washington, or from your congressman or senator. It will interest all lovers of the iris. It contains 46 pages of text, is well illustrated with photographs, drawings and charts. It covers the general field of iris culture very well and will furnish specific help with many iris problems. Ask for Farmers' Bulletin No. 1406, "Garden Irises," in writing.

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GARDEN REMINDERS

(Continued from Page 5)

of bonemeal—do not keep them out of the ground too long and don't think you must lift them every year.

This month and next are the best months for replanting and dividing your Iris— reset the outer growth of the clump and throw away the inner that has exhausted itself.

Continue to plant out marigolds and zinnias fight a battle with ants, slugs and snails.

CHRYSANTHEMUMS

80 choice varieties of Market and Show Mums—Stanards Pompons, Anemones, and Singles, at retail, postpaid. Some of my novelties this year are—Yukon, Snow-Bound, Distinction, Oct. Rose, Bokhara and Yellow Fellow. Write for Descriptive Circular. Name this paper.

M. A. WALLACE

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PLANTS ON DRY LANDS

By Harry Johnson.

(Concluded from May Number)

The normal disposition and inclination of the leaves to light may be greatly disturbed. Plants from regions where water is abundant generally place their leaves to take full advantage of the sunlight. In dry regions, on the other hand, where the insolation is usually intense and more than sufficient for the reduced activities of xerophytes, the leaves of eucalypti, leptospermums and others may be pendent or the edges only may be presented to the noon sun. In this way the subdued light of morning and evening may be utilized while the desiccating midday rays pass harmlessly by. Travelers tell us of the shadeless forests of Australia where the profile leaves throw no shadows.

In some cases the leaves overlap one another as in *Fabiana*; this gives the necessary protection and yet does not greatly impede food manufacture. A further modification of the same feature occurs when the axis is shortened, thus bringing the leaves into close proximity. The rosette or distichous type of *Gasteria* results. The rosette is adopted by many families of plants and it is obviously very effective. Its development is a simple matter; the lack of stem development is a great saving of material while the disposal and inclination of the leaves makes possible an expanded blade that is at the same time protected. In plants growing in regions where the daily temperature range is great as in alpine habitats, the ill effects of such changes are to an appreciable extent mitigated by the rosette habit, the leaves being closely pressed to the heat retaining soil. In California this habit seems to be adopted principally by the crevice plants and we have many local representatives, particularly among the *Crassulaceae*—such as *Dudleya*, *Hasseanthus*, *Cotyledon*, *Stylophyllum*, etc. The greater number of succulent plants grown in gardens, outside the cacti and euphorbias, have adopted this leaf arrangement. In the tropics the great family of bromeliads is almost entirely composed of such rosette and vase-formed types. High in the trees these natural vases cling with bare roots to the naked branches. Water from the torrential rains fill the pitchers and is absorbed by submerged hairs on the leaf bases. Some of the reservoirs harbor an aquatic flora and fauna peculiar to themselves. In the water fountains of one bromeliad grows a bladderwort which loops from pitcher to pitcher and busily catches tiny animalcules in its pouched traps.

The so-called ericoid type of leaf has many representatives. In this case the leaf margins are rolled back to protect the under stomatal surface. Our common sticky monkey-flower has leaves headed in this

direction as are also the leaves of the live oak and many ceanothi.

Inrolling of the leaf is a common means of protection against temporary desiccation. The stomata are thus inclosed within an inrolled tube and water loss is reduced. Since grasses quite generally exhibit this protective movement one may see this phenomenon any day by omitting to water the lawn.

Motile leaves of many legumes are quite probably effective in reducing transpiration. The leaflets close one upon another, greatly reducing the exposed surface. The common sensitive plant (*Mimosa pudica*) will close up during droughts. When growing wild it seems to choose sandy places where the soil soon becomes dry.

The surface of leaves is quite commonly covered with hairs which may vary greatly in number, length, stiffness, color, and may be simple, branched or radiate. These hairs are lifeless epidermal outgrowths, their cell or cells being filled with air. They may afford considerable protection to the stomata and reduce surface evaporation. For the net of hairs imprisons the air next the epidermis, thus presenting a layer of dead air between the transpiring surface and the outer atmosphere. Quite generally the pubescence is light colored and glossy, thus serving to reflect the light rays away from the leaf.

The internal structure of the leaf has been greatly modified to check the excessive transpiration and to protect the chlorophyll bearing cells from too intense light. In looking at the cut end of a leaf taken from a normal moisture loving plant, we would see beneath the microscope, something like the following sequence of tissues; on the outside a structureless layer called the cuticle and below this a single layer of cells forming the skin or epidermis; beneath this on the upper surface, a row or so of elongated cells containing small green-colored bodies scattered through them; next a spongy mass of tissue with abundant air spaces, and last of all a lower epidermis beset with stomatal openings through which connection is maintained between the inner tissues and the outside air.

This type of leaf is eminently fitted to its purpose under favorable growing conditions, but it fails under more rigorous climatic demands. Since the thin cuticle does not sufficiently hinder evaporation it may become greatly thickened even to twenty or more times the normal size. The leaf of chamisso (*Adenostoma*) has a very heavy cuticle while that of many orchids and cacti is like parchment. While collecting in Central America I had reason to observe this in preparing orchid specimens for herbaria. Some species,

particularly of *Epidendrum*, apparently lost but little moisture even when killed with boiling water. I have had them drying for three weeks in the full sun of a coffee drying patio without results. By slitting the epidermis and so exposing the water holding tissues, drying was effected in a few days. The tough, leathery texture of many leaves such as those of *Rhododendron*, *Arctostaphylos* and other *Ericaceae*, *Myrtaceae*, etc., is due to this strong development of cuticle.

A waxy covering over the cuticle enhances the protective value of the latter. Many *Liliaceae* resort to this added protection. The breathing pores (stomata) are normally very numerous and unprotected. By lessening their number and disposing them on protected surfaces only, their activities may be reduced. As a further protection they may be sunken at the bottom of pits; this occurs in the pines and aloes. They may line certain furrows in the leaf or stem as in Spanish broom and cacti. In many of our California shrubs (*Adenostoma*) a ridge of cuticle is raised around them. A result of all these developments is that the wind does not enter the depressions. Hence they may become filled with saturated air and thus reduce the moisture loss.

A distinctive arrangement of the palisade cells is common in xerophytes. They may become elongated and arranged in two or more series. Since chloroplasts are easily destroyed by too brilliant sunlight the elongation permits them to retreat to the shaded depths when the light is too intense. In some orchids the palisade tissue is on the under side of the leaf and is protected above by layers of water storage cells. The cells are fitted closely together with small room for air spaces.

The spongy or water-storage tissue of xerophytic leaves is generally much reduced and the spongy quality is more or less lost, hence the cells fit rather closely together. This reduction of internal air space is correlated with reduction of stomata, and the two factors, working in harmony, tend to check transpiration.

A thick and viscid sap is another preventative of excessive water loss commonly resorted to, particularly by the succulents. This glutinous property of the sap is well exhibited in the common Indian fig (*Opuntia*). It is surprising with what tenacity the enmeshed water is held.

In the case of many lower plants such as algae, lichens, mosses and ferns, no protective features are set up. When drought overtakes them they simply lose their moisture and become powder dry. They have remarkable recuperative powers, however, and with renewed water supply continue growth just where they left off. Familiar examples are the green scurf on trees and old buildings, the grey rock lichens and the common gold-

back ferns of our hills.

In certain forms of euphorbias, cacti, and a few senecios, the most striking drought resistant modifications have been instituted. Here the normal plant form has been entirely obscured. Leaf reduction has progressed to such a point that only caducous scales are left. The stem, taking over the work of photosynthesis, becomes broadened or rounded, while ridges for protecting the exposed green surface have formed. The mechanical tissue within the stem is reduced while the water-holding tissue has been enormously increased; the sap has acquired a decidedly mucilaginous or milky character, a heavy cuticle covers the plants and the stomata are few in number and sunken in protective furrows. In *Euphorbia* an acrid, poisonous juice protects the plants from the depredations of animals. The spines of cacti serve for protection and in the case of *mamillaria*, *Echinocactus*, etc., where they are numerous and close together, they probably retard transpiration. Many plants assume a crowded and tufted habit and seek protection at the base of rocks. The root system is shallow and much branched to receive and absorb immediately the light and transient rains. The flowers, too, show the influence of a dry climate, since no protection from rains is afforded, except to close when the sun is not shining; the pollen is freely exposed to the elements.

The succulent plant deserts of the world are restricted and they seemingly require for their perfection a set of ecological features not yet fully understood. A rocky soil, light rainfall, a long hot period and not too pronounced a cold period, quite generally accompanies their best development. In the United States two such areas may be defined—one in southern Texas north of the Río Grande, and the other in southern California and Arizona. Many species of cacti are found outside of these areas; some flat stemmed *Opuntias* range far north into Canada, while south of the United States even in the wet tropics, thousands of species are found. Succulents belonging to the families *Saxifragaceae*, *Crassulaceae*, and *Liliaceae*, however, are quite generally found outside these areas, their development seeming to depend on less rigorous conditions.

From the above discussion it may be seen that environmental factors—rain, wind, heat, cold, soil conditions—are the moulding influences which determine the character of the earth's floras. Everywhere plant life must fit itself to the environment or perish in the perennial struggle for existence; each pond, each swamp, each ledge or hillside tells the same fascinating story. But among them all there is none more peculiar or more repaying of study than the story of the xerophytes—those dry-land plants so characteristic of our State.

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